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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,723	10/16/2003	Randy Dean May	SP-04	1753
20985	7590	04/12/2005	EXAMINER	
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081			ROSENBERGER, FREDERICK F	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 04/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/688,723	MAY, RANDY DEAN	
	<b>Examiner</b>	<b>Art Unit</b>	
	Frederick F. Rosenberger	2878	

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date: _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date: _____  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Information Disclosure Statement*

1. Applicant is advised that no Information Disclosure Sheet was received with this application.
2. Translation of German patent # DE-3413914-A1 was received on August 5<sup>th</sup>, 2004. However, an appropriate information disclosure sheet with designation of the above foreign reference has not been received. Thus, the above reference fails to comply with 37 CFR 1.98. As such, it has not been considered.

### *Drawings*

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **625**, **650** (page 6, line 4 in reference to Figure 6 and page 6, line 7 in reference to Figure 7), and **515** (Page 9, line 20 in reference to Figure 5). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by

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the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "3" has been used to designate both pipeline (shown as the circle on the right in Figure 1) and an element located within the sampling shelter (shown as the 3<sup>rd</sup> box from the left within box 15 in Figure 1). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "519" (page 9, line 21) and "523" (page 9, line 21) and "527" (page 9, line 23) have both been used to designate the light source. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing

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sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "27" (Figure 1) and "31" (page 9, line 13) have both been used to designate the feedline. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the

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description: 1 and 2 (as shown in Figure 1). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

8. Claims 1 and 6-9 are objected to because of the following informalities:

Claim 1, line 4: "light from emitted from" should be "light emitted from".

Claim 1, line 7: The phrase "the level of water vapor in the natural gas" is repeated from line 6.

Claim 6, line 2: The positive recitation of "the sensor" lacks proper antecedent basis in parent claim 1. For the purposes of this Office action, "the sensor" is interpreted to refer to the detector as recited in claim 1.

Claims 7-9, line 1: The positive recitation of "the laser" lacks proper antecedent basis in parent claim 1. For the purposes of this Office action, "the laser" is interpreted to refer to the light source as recited in claim 1. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1, 5, 10, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Lievois et al. (US Patent # 6,292,756).

Lievois et al. disclose a method and system capable of detecting water vapor in natural gas comprising:

A light source **94** (Figure 4) emitting light at a frequency where water molecules absorb light at a substantially greater level than natural gas molecules (column 5, lines 5-8 and column 11, lines 33-36);

An InGaAs detector **96** (Figure 4 and column 6, lines 11-13) configured to detect the intensity of light emitted from the light source;

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And electronics, in the form of flow computer **66** (Figure 3 and column 5, lines 44-47) coupled to the detector **96** through signal conditioning circuit **68** for determining the level of water vapor in the gas flow.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lievois et al., as applied to claim 1 above, and further in view of Inman et al. (US Patent # 6,188,475).

Lievois et al. disclose all of the elements of the parent claim 1, as described above. However, Lievois et al. are silent with regards to the limitations of claim 2-4, wherein the source is a specific laser type. Lievois et al. only disclose a light emitting diode.

Inman et al. teach an in-line cell for absorption spectroscopy that employs a diode laser source to emit light at a wavelength characteristic of the impurity within the sample gas (column 5, lines 63-67). For the light source, Inman et al. employ a laser diode or other suitably sized tunable lasers, such as fiber lasers or quantum cascade lasers.



It would have been well known to a person having ordinary skill in the art at the time of the invention that laser diodes are preferential for their narrow emission spectrum and beam width compared to LED devices, as used by Lievois et al. Such a characteristic would be desirable, as narrow emitted bandwidth would excite only the impurity and not the sample gas, resulting in less noise and more reliable measurement. It would have been further evident that selection of the particular laser, whether a diode laser, color center laser, or quantum cascade laser, would be predicated on size and cost issues. From the viewpoint of performance within the context of the invention, use of a diode laser, color center laser, or quantum cascade laser as the light source, per the limitations of claims 2-4, would be functionally equivalent.

Thus, it would have been obvious for a person having ordinary skill in the art to modify Lievois et al. such that LED light source is replaced with a diode laser or similar laser source to provide a narrower emission spectrum for efficient detection of water within a gas flow, as taught by Inman et al.

13. Claims 6-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lievois et al., as applied to claim 1 and 10 above, and further in view of Murray, Jr. et al. (US Patent # 5,107,118).

Lievois et al. disclose all of the elements of the parent claims 1 and 10, as discussed above. However, Lievois et al. are silent with regards to the additional limitation of claim 6, wherein calibration means are provided for calibrating the detector based on known concentrations of water vapor in the sample gas. Although calibration

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methods are implied (column 7, lines 1-8 and column 11, lines 45-52), Lievois et al. do not specifically mention calibration methodology with known water vapor content in a sample gas.

Murray, Jr. et al. teach measurement of water levels in hydrocarbon media such as natural gas using absorption of a light radiation at a given wavelength by the water. Murray, Jr. et al. further teach a calibration method compatible with such an absorption based measurement system wherein a calibration curve is constructed based on the detected signal for various known water content samples (column 7, lines 5-8 and 15-20).

Thus, it would have been obvious for a person having ordinary skill in the art to modify Lievois et al. to include calibration means based on the known water content in the sample gas to enhance the accuracy of the absorption based method, as taught by Murray, Jr. et al. (column 7, lines 26-28).

Lievois et al. are further silent with regards to the limitations of claims 7-9, wherein the laser operates within specific wavelength ranges. Lievois et al. only discuss a wavelength of 1450nm for water vapor detection (column 11, lines 33-36), although Lievois et al. do allow for other wavelengths within the near to mid infrared region that act similarly to the wavelength at 1450nm (column 11, lines 41-43).

Murray, Jr. et al. teach that the desired wavelength range for the absorption based measurement of water vapor in a sample gas is 2710nm to 2747nm, to allow for adequate differentiation between absorption due to water and due to the sample hydrocarbon gas (column 6, lines 32-38).

Thus, it would have been obvious for a person having ordinary skill in the art to modify Lievois et al. to use a wavelength range of 2710nm to 2747nm for the emitted wavelength of the laser source so as to provide adequate discrimination between the host natural gas and the contaminant water, as taught by Murray, Jr. et al. It would have been further obvious to one of ordinary skill in the art at the time the invention was made to use either of wavelength ranges specified in claims 7 and 9, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

14. Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lievois et al., as applied to claim 1 above, and further in view of Brand et al. (US Patent # 6,064,488) and Lehmann (US Patent # 5,528,040).

Lievois et al. disclose the limitations for the light source, detector, and electronics, as discussed above in regards to claim 1. Lievois et al. further detail the use of a supply line (Figure 1, between boxes **104** and **106**; column 3, lines 63-67) to provide a gas supply to the gas sensor. However, Lievois et al. are silent with regards to the gas sensor including a Herriott cell with two opposing mirrors.

Brand et al. teach the use of a Herriott cell **16** (Figure 1) with two opposing mirrors **26**, **27** (Figure 1) in an in-situ gas concentration measurement apparatus employing a tunable diode laser.

Lehmann discloses that in absorption spectroscopy, multiple path length optical cells are often used to increase detection sensitivity of trace species in the sample gas (column 4, lines 54-59), often taking the configuration of a White cell or a Herriott cell or variation thereof (column 4, lines 59-61). Further, when using a laser source, the Herriott cell configuration is preferable over White cells for its decreased sensitivity to mechanical vibration and convection effects (column 3, lines 3-11).

Thus it would have been obvious to a person having ordinary skill in the art to modify Lievois et al. to include a Herriott cell for increased detection sensitivity of trace amounts of water vapor in the natural gas sample with minimal noise effects from external variables, as taught by Brand et al. and Lehmann.

Lievois et al. are further silent with regards to the sampling shelter for housing the gas sensor.

Brand et al. teach that the apparatus for sensing gas concentrations via gas absorption spectroscopy is housed within enclosure 40 (Figure 2 and column 3, lines 56-60), thus acting as a sampling shelter for attaching the sensor system to the wall 39 (Figure 2) of a stack or pipeline.

Thus it would have been obvious to a person having ordinary skill in the art to provide the sensor system of Lievois et al. in a sampling shelter to protect the sensor and allow it to connect to the pipeline of interest for sampling the gas under test, as taught by Brand et al.

### ***Double Patenting***

15. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Omum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

16. Claims 1-3 and 5-12 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 6-13 of U.S. Patent No. 6,657,198. Although the conflicting claims are not identical, they are not patentably distinct from each other because they disclose the same structure and methodology for the system for detecting water vapor in natural gas with slight changes in wording and source characteristics.

Claims 1-3 and 5-6 of the current application are directed towards a system for detecting water vapor in natural gas wherein the light source emits light at a frequency where water molecules absorb light greater than natural gas molecules. Claims 9-13 of US Patent # 6,657,198 are directed towards the same system wherein the light source emits light at a frequency approximately corresponding to a frequency where water molecules absorb light greater than natural gas molecules.

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Claim 7 of the current application is directed towards a system for detecting water vapor in natural gas wherein the light source is a laser operating at a wavelength in the range of 1.877-1.901 $\mu$ m. Claim 1 of US Patent # 6,657,198 is also directed towards a system for detecting water vapor in natural gas wherein the light source emits light at a frequency in the wavelength range of 1.877-1.901 $\mu$ m. While claim 1 of the patent does not discuss the use of a laser, such use for the light source would have been obvious to one skilled in the art.

Claims 8-12 of the current application are directed towards a system and method for detecting water vapor in natural gas wherein the light source emits a frequency in various wavelength ranges. Claims 1 and 6-8 of US Patent # 6,657,198 are directed towards a system and method with the same structure but with a wavelength range of 1.877-1.901 $\mu$ m. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Thus, claims 1 and 6-13 of US Patent # 6,657,198 anticipate the claims 1-3 and 5-12 of the current application.

17. Claim 4 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 10 of U.S. Patent No. 6,657,198 in view of Inman et al. (US Patent # 6,188,475). The conflicting claims are identical, as described above in regards to claim 1 of the present application, except that US Patent

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# 6,657,198 discloses the use of a tunable diode laser for the light source instead of the presently claimed quantum cascade laser.

Inman et al. teach an in-line cell for absorption spectroscopy that employs a diode laser source to emit light at a wavelength characteristic of the impurity within the sample gas (column 5, lines 63-67). For the light source, Inman et al. employ a laser diode or other suitably sized tunable lasers, such as fiber lasers or quantum cascade lasers. From the viewpoint of performance within the context of the invention, use of a diode laser, color center laser, or quantum cascade laser as the light source, per the limitations of claim 4, would be functionally equivalent. It would be obvious to one skilled in the art to use either a tunable laser or a quantum cascade laser dependent upon size, cost, and performance requirements external to the particular laser's function within the system. As such, claim 4 of the present application is not patently distinct over claim 10 of US Patent # 6,657,198.

### ***Conclusion***

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday-Friday 7:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Frederick F. Rosenberger  
Patent Examiner  
GAU 2878



**DAVID PORTA**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**